

Key to Indian spiders¹

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(With eighty text-figures)*

INTRODUCTION

This paper on Indian spiders is intended as a popular guide for the identification of spiders at least upto the family and generic levels with notes on their habitats, behaviour and how to collect them and preserve them for scientific study or museum display. Spiders are geologically very old and although spiders are extremely abundant throughout the country from sea shore to the high Himalayan mountains, our knowledge of Indian spiders is extremely fragmentary. One of the earliest contributions on Indian spiders was by Stoliczka (1889), while Karsch (1873), Thorell (1895), Pocock (1900) and Gravely (1924) added considerably to our knowledge of Indian spiders.

During my study of spiders, over the last two decades, I felt the necessity for a handbook on spiders of India for the benefit of laymen as well as for the student for easy identification of Indian spiders as well as to create interest of Arachnology in them.

It would gratify me if this paper would serve in some measure to create some interest in the readers on spiders as a stepping stone for the future advancement of arachnology in India.

I am indebted to the following for help,

¹ Accepted February 1975.

encouragement and useful information of various kind: Dr. M. S. Mani, Emeritus' Professor of Entomology, St. John's College, Agra, Mr. J. C. Daniel, Curator, Bombay Natural History Society and Dr. M. Babu Rao, Zoological Survey of India, Western Regional Station, Poona.

WHAT ARE SPIDERS?

Generally Spiders are confused with Insects, however, spiders can be easily separated from insects by the following characters:

SPIDERS

1. Body divided into two unsegmented parts; cephalothorax (or head) and abdomen.
2. Cephalothorax has four pairs of legs and a pair of six segmented pedipalps modified in the male sperm for transport.
3. Wings absent; eyes simple, two to eight in number.
4. Respiration by book lungs and genital pore on the ventral side near anterior end of abdomen.
5. Silk apparatus always present, opening at hind end of abdomen below anus.
6. Poison apparatus opening on fangs of chelicerae.
7. Development direct, no larval stages, spiderlings resemble their parents.

INSECTS

1. Body divided into three parts; head, thorax and abdomen.
2. Head has a pair of antennae and the thorax three pairs of legs.

3. Generally paired wings present in adult and eyes commonly compound ocelli.
4. Respiration by ostia and genital pore just below anus at posterior end of abdomen.
5. Silk apparatus absent in adults, present only in some larvae which open on the lower lip.
6. Poison apparatus, if present usually opening at posterior end of abdomen.
7. Development may have a metamorphosis with larval and pupal stages or with nymphs.

The class Arachnida includes many other animals like scorpions, whip-scorpions, pseudoscorpions, king-crab, solifugids, daddy-long-legs, ticks and mites. The daddy-long-legs (harvestmen) are often confused with spiders mainly with the Pholcidae spiders. But the former may be readily separated from spiders by the fact that they have the abdomen noticeably segmented and broadly joined to the cephalothorax and also lack the spinnerets at the posterior end of the abdomen.

HABITAT OF SPIDERS

Spiders make up a considerable portion of the animal life of this vast and diversified land. They are widespread and are found in all types of habitats and occupy all but a few niches.

Spiders may be found near water's edge, on the ground, in underground caves and the top of mountains. In fact jumping spiders have been collected from Mt. Everest (22,000 feet), the highest elevation at which any animal has ever been found. It is recorded that ballooning spiderlings have been collected from airplanes at an elevation of 5000 feet. Some spiders like Pholcidae, Oecobidae, Heteropodidae and Filistatidae live inside human habitations, and others frequent the walls outside. Almost every plant has its spider fauna, as do the dead leaves on the forest floors, and on trees in winter. They may be found under bark, under stones, under fallen logs, these are only a few exam-

ples of their various habitats. There may be different varieties of spiders even in a small area as for example almost 600 species of spiders are known from Connecticut, a very small state of America. The number of individuals is also very high in a given area. One worker in America found a population of 407,000 per acre of clay meadow, and another over 2,200,000 per acre of grassy field.

Some ground spiders like *Geolycosa* and trap-door spiders of Western Ghats dig holes in the ground and remain there during their whole life, except for the short period when the male ventures out to seek a mate. The silklined tunnel of *Atypus* extends partly into the ground, and partly along the surface of a tree. The wolf spiders, mainly *Lycosa* and *Hippasa* may make use of shallow holes in which they hide. Many gnaphosids and some clubionids run over the ground and have been found under stones in the foothills and in the forests.

Many spiders like Uloboridae, Pholcidae prefer dark and shaded places, where the humidity is high. Some *Pardosa* and *Lycosa* species are found along the edges of streams and ponds, running over the water surface quickly and in an emergency they can dive under water. *Araneus* and *Tetragnatha* species also prefer water sources but are usually found on the shrubs, which overhang the ponds or streams.

Many crab-spiders like *Thomisus* and *Misumenina* live among flowers, waiting in ambush for insect visitors who come for nectar on the flowers. It was observed that crab spiders change their colour according to the colour of the petals of the flowers. *Tibellus*, *Thanatus* and *Oxyopes* run along green grass leaves or stems, clubionids and salticids hunt from leaf to leaf. Hersilid spiders live on the wall of houses and tree trunks; they are usually dark in colour like the bark of a particular tree or

wall, on which they occur.

The only social spider *Stegodyphus sarasinorum* Karsch, has attracted the attention of many naturalists in India. They build their nests in the foliage of *Acacia arabica* or *Zizyphus* sp.

Many species are found in tall grass, on bushes and trees. Some run over the branches and trunk and hide under loose bark and in crevices. Snares may be built among twigs and many linyphiids, theridiids and argiopids construct their webs in tall grass, bushes and tree foliage.

Some spiders mimic other animals and among these the ant-like species are most common. Many examples are known in several families and often the mimicry extends not only to the shape of the body but sometimes to the behaviour too.

COLLECTION AND PRESERVATION OF SPIDERS

The collection of spiders is very easy as they are available in a variety of habitats.

One of the oldest collection methods for getting spiders in large numbers is by using a sweep net, through tall grass and weeds and picking out the spiders from among the insects, leaves and debris that will be gathered with them. It is more effective if an umbrella is inverted underneath flowering shoots or bushes and to thoroughly shake the shoots or bushes, when spiders along with a variety of insects, mites etc. will be collected in the umbrella. After removing the leaves etc. from the umbrella the spiders can be transferred into collecting tubes containing 75 per cent alcohol with the help of a fine brush. It is very essential to see that only a small number of specimens of spiders are kept in a single tube, otherwise spider specimens will be preserved in bad shape due to the pressure of the upper layers

and this type of preserved specimen is not useful for scientific study.

For purposes of scientific study, when the specimens preserved in alcohol are brought to camp or laboratory, from the field, the collection should be transferred into a petri dish after two or three hours and the spiders separated and preserved in the following manner:

The ideal way of preservation is to keep the specimens in a petri dish containing 75 per cent alcohol and adjust the body parts (legs etc.) as it is in live condition with the help of brush, forceps and needle. The specimens should be kept in this condition in the petri dish overnight before transferring them into tubes for permanent preservation.

The Mygalomorph spiders which live in burrows and which are big in size are best collected by keeping an empty tube against the burrow and allowing the spider to crawl into the tube. The spider is then put in a *Cyanide bottle* for killing. Later it is transferred into a tube containing 75 per cent alcohol.

The smaller spiders, especially those belonging to the families Oonopidae, Caponiidae, which live under the barks of big trees need careful search to locate them. A brush dipped in alcohol should be used to transfer the small spiders from under the barks into the tubes containing alcohol. In all cases too many specimens should not be put in one specimen tube and as far as possible the specimens should be arranged in their natural posture before preservation. Whenever there are more than one specimen in a tube, the tube containing the specimens should be filled with alcohol upto $\frac{3}{4}$ th height and the tube should be very lightly shaken horizontally to allow the specimens to spread out. Then the tube should be kept in horizontal position overnight so as to allow the specimens to spread out and get fixed in that position. Later

on the tube can be kept in normal position for permanent preservation.

Spiders can be arranged in a petri dish or cavity block in alcohol medium and studied under binocular microscope.

NAME OF BODY PARTS OF SPIDER

The body of the spider is divisible into a distinctive *cephalothorax* and *abdomen*, jointed together by a narrow *pedicel*. The *cephalothorax* is covered dorsally by a hard sclerotic shield, the *carapace*, and ventrally by the *sternum*. The anterior margin of sternum articulates movably with the *labium*. With few exceptions there is a deep transverse groove, forming a kind of hinge, between the sternum and the labium. The legs are articulated in the pleural membrane between the lateral edges of the *carapace* and *sternum*. On the cephalic region are present two to eight simple eyes. The eyes are generally of two kinds, namely, black or *diurnal* and white or *nocturnal* eyes. When only one type is present, the condition is described as *homogeneous* in contrast to the *heterogeneous*, when both the types are present. The eyes are usually arranged in a double row, an *anterior row* and a *posterior row*. Each row usually contains four eyes. The eye row is described as *recurved*, when the concavity of the curve is directed backward, and as *procurved* when the concavity is turned forwards. According to their position, the eyes are described as the *anterior medians*, the *posterior medians*, the *anterior laterals* and the *posterior laterals*. The cephalic area, occupied by the eyes, is known as *ocular area*. The area margined by the four median eyes is termed *ocular quad*. The area between the anterior row of eyes and the base of chelicerae is the *clypeus*. The space between the anterior median eyes and the margin of clypeus re-

presents the *width of clypeus*. There is often a depression in the middle of the thorax, called *thoracic groove*. A convex, lens-like, black or deep brown mark called fovea replaces the thoracic groove in the families Gnaphosidae and Drassodeac.

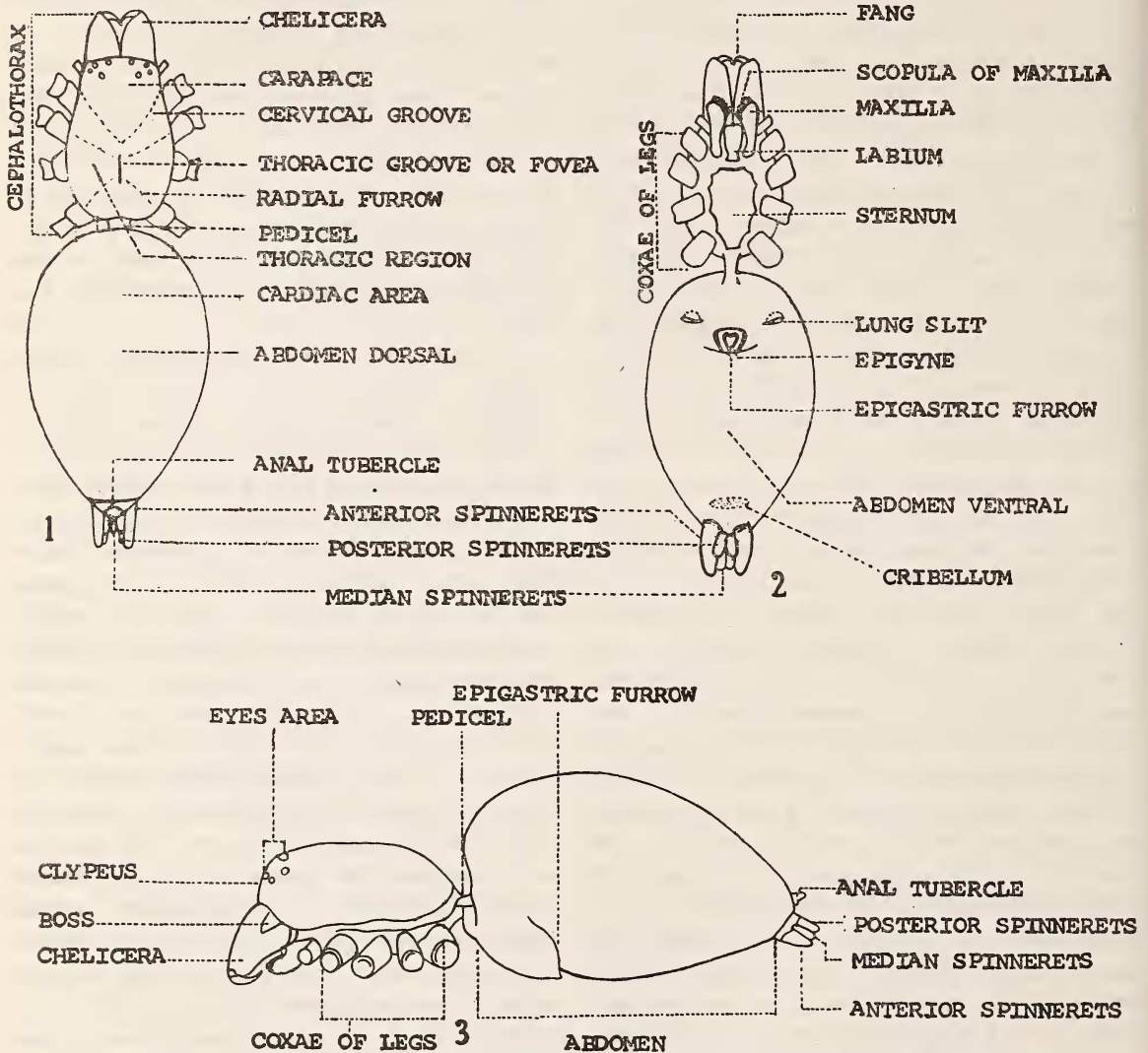
The *chelicerae* are the first pair of appendages of the cephalothorax. Each chelicera bears a curved *fang* at its apex. The inner surface of chelicera may be finely denticulate and may also have a groove, into which the fang can be closed when not in use. This groove may also be armed with teeth on each side; the outer row of these teeth is described as *promargin* and the inner row as *retromargin*. There are sometimes long stout hairs on the promargin to constitute the so-called *fang scopulae*.

The pedipalps are the second pair of appendages. The *palp* proper is composed of six segments, *coxa*, *trochanter*, *femur*, *patella*, *tibia* and *tarsus*. In females the tarsus is simple and may or may not be with a single claw. In mature males the tarsus of palp is modified to carry a more or less complicated *copulatory organ*. Generally the tibia, sometimes also the patella constitute *apophyses* (which may be of different variety of shapes in different species) and which is of important taxonomic value. In many spiders the tarsus has a bowl-shaped cavity on its ventral surface called *cymbium*. In many groups mature males are provided with an appendage, the *paracymbium*. The structure of mature male palp is very important for generic or specific identification of spiders. The complicated palpal organ has many parts, but that is a matter beyond the scope of this paper. There are four pairs of legs designated I, II, III and IV respectively. Each leg is composed of seven segments, *coxa*, *trochanter*, *femur*, *patella*, *tibia*, *metatarsus* and *tarsus*. The legs are variously

clothed with spines, spinules, bristles and hairs of various types. The tarsus ends are provided with two or three claws. A characteristic tuft of hairs called *claw-tuft* is sometimes found just above the claw. In the Gnaphosidae there are dense rows of hairs called *leg-scopulae* below the metatarsi and tarsi. Spines on the

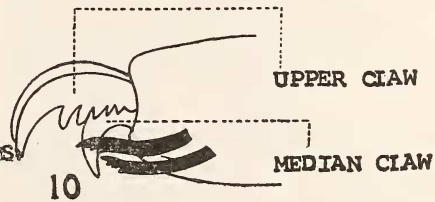
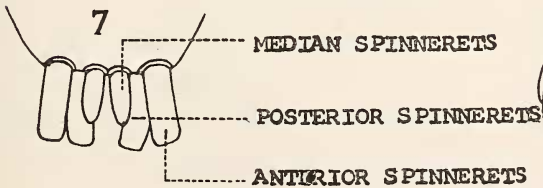
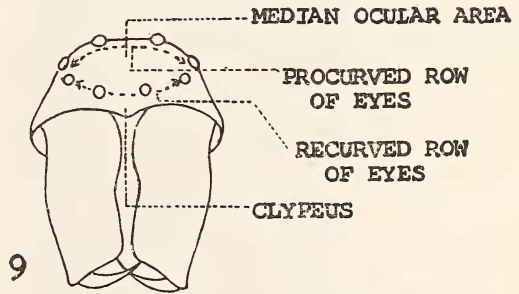
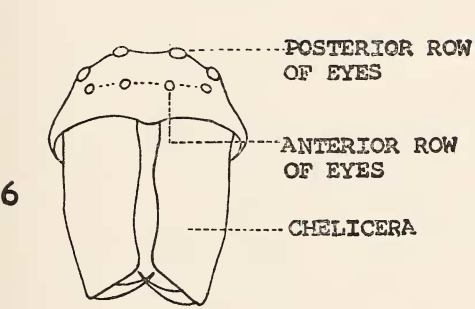
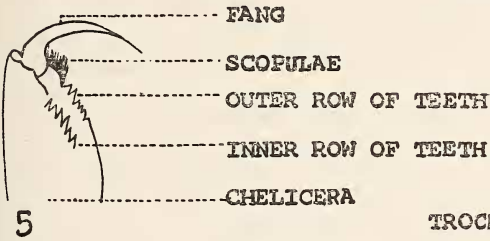
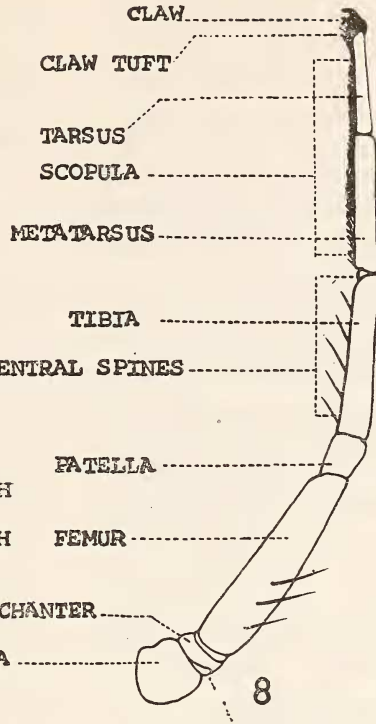
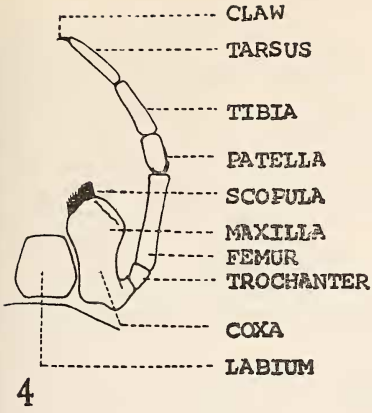
dorsal sides of legs are distinguished as *dorsal spines* and those on the ventral side as *ventral spines*.

The abdomen is produced posteriorly into a conical *anal tubercle* and bears three pairs of spinnerets ventrally, viz., the first or the *anterior pair*, the second or the *median* and



Figs. 1-3. Three views of spider, without legs, showing parts labeled. (1) Dorsal. (2) Ventral. (3) Lateral.

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Figs. 4-10. (4) Pedipalp of female. (5) Fang. (6 & 9) Face and chelicerae from the front. (7) Spinnerets. (8) Leg. (10) Claw.

the third or the *posterior pair* of spinnerets. In a number of families there is present in front of the anterior (ventral) spinnerets a seive-like plate, called the *cribellum*. The special type of silk emitted from this organ is combed by the calamistrum borne on metatarsus IV. In many families of spiders which do not possess the *cribellum* a conical appendage called the *colulus*, lies between the bases of the anterior spinnerets.

The ventral surface of abdomen is provided with one or two pairs of lung-books, followed by one or two paired spiracles. The female genital opening is the *vulva* or *epigyne*, with a transverse fold, known as *epigastric furrow*.

The tarsi of spiders are often armed with hairs of the type known as *tenent hairs*, i.e., hairs dilated at their tips, and as in insects, secrete an adhesive fluid. Setae which are stout apically and clubshaped, as in *Oxyptila*, are called *clavate hairs*, Argiopidae have very fine hairs known as *pubescence*. Sometimes the hairs are modified as *spiny-hairs*.

KEY FOR THE IDENTIFICATION OF SPIDERS

The key is based on characters that can be readily distinguished such as the number of tarsal claws, the arrangement of the eyes and manner in which the legs are turned. In the key, characters such as these are arranged, in couplets, each half of the couplet bearing the same number but different letters, as 1a, 1b, 2a, 2b, and so on. The characters given are contrasting, and the student, while examining the specimen, must decide which alternative fits. At the end of each statement of characters is a number indicating which couplet is to be tried next, until eventually a couplet line ends in a name, which should be that of the specimen in hand.

To assist the student in visualizing the position of any spider in the system a list is appended giving the placement of spider families

in accordance with the view of the author. Those families whose names are preceded by a single asterisk have representatives in the Indian sub-continent.

LIST OF FAMILIES AND HIGHER CATEGORIES OF SPIDERS

Order ARANEAE

Suborder—Orthognatha Mesothelae (atypical tarantulas)

Family

- *1. LIPHISTHIDAE Thorell 1869.
- 2. ANTRODIAETIDAE Gertsch 1940.
- 3. MECICOBOTHRIIDAE Holmberg 1882.
- *4. ATYPIDAE Bertkau 1878.

Opisthothelae (typical tarantulas)

Family

- *5. THERAPHOSIDAE Thorell 1869.
- 6. PARATROPIDIDAE Pocock 1903.
- 7. PYCNOTHELIDAE Petrunkevitch 1923.
- *8. BARYCHELIDAE Pocock 1897.
- 9. MIGIDAE Pocock 1897.
- *10. DIPLURIDAE Pocock 1897.
- *11. CTENIZIDAE Thorell 1887.
- 12. ACTINOPODIDAE Pocock 1903.

Suborder—Labidognatha Hypochiloidea

Family

- 13. GRADUNGULIDAE Forster 1955.

Neocribellatae

Family

- *14. FILISTATIDAE Ausserer 1867.
- *15. OECOBIDAE Blackwall 1862.
- *16. ERESIDAE Koch 1850.
- 17. DINOPIIDAE Koch 1850.
- *18. ULOBORIDAE Cambridge 1871.
- *19. DICTYNIDAE Cambridge 1871.
- *20. AMAUROBIIDAE Bertkau 1878.
- *21. PSECHRIDAE Simon 1890.
- 22. TENGELLIDAE Dahl 1908.
- 23. ZOROPSIDAE Bertkau 1882.
- 24. ACANTHOCTENIDAE Cambridge 1902.

Ecribellatae

Haplogynae (Primitive hunters and weavers) Family

- 25. SICARIIDAE Keyserling 1880.

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- *26. SCYTODIDAE Blackwall 1852.
- *27. LOXOSCELIDAE Gertsch 1949.
- 28. DIGUETIDAE Gertsch 1949.
- 29. PLECTREURIDAE Banks 1898.
- *30. CAPONIIDAE Simon 1890.
- *31. OONOPIDAE Simon 1890.
- 32. TETRABLEMMIDAE Cambridge 1873.
- 33. OCHYRO CERATIDAE Fage 1912.
- 34. LEPTONETIDAE Simon 1890.
- 35. TELEMIDAE Petrunkevitch 1923.
- 36. DYSDERIDAE Koch 1837.
- 37. SEGESTRIIDAE Petrunkevitch 1933.

Entelogyinae

Trionycha (Higher web weavers)

Family

- *38. PHOLCIDAE Koch 1850.
- 39. SYMPHYTOGNATHIDAE Hickman 1931.
- *40. THERIDIIDAE Sundevall 1833.
- 41. NESTICIDAE Dahl 1926.
- 42. HADROTARSIDAE Thorell 1881.
- *43. LINYPHIIDAE Blackwall 1859.
- 44. MICRYPHANTIDAE Bertkau 1872.
- 45. THERIDIOSOMATIDAE Vellard 1924.
- *46. ARGIOPIDAE or ARANEIDAE Dahl 1912.
- *47. TETRAGNATHIDAE Menge 1866.
- *48. AGELENIDAE Koch 1837.
- 49. ARGYRONETIDAE Menge 1871.
- 50. DESIDAE Pocock 1895.
- *51. HAHNIIDAE Bertkau 1878.

Three clawed hunters

Family

- *52. HERSILIIDAE Thorell 1869.
- *53. UROCTEIDAE Thorell 1869.
- 54. MIMETIDAE Simon 1890.
- 55. ARCHAEIDAE Koch 1854.
- *56. ZODARIIDAE Thorell 1881.
- 57. PALPIMANIDAE Cambridge 1871.
- *58. PISAUROIDAE Simon 1890.
- *59. LYCOSIDAE Sundevall 1833.
- *60. OXYOPIDAE Thorell 1869.
- 61. SENOCULIDAE Simon 1890.
- 62. TOXOPIDAE Hickman 1940.

Dionycha (two clawed hunting spiders)

Family

- 63. AMMOXENIDAE Simon 1893.
- *64. GNAPHOSIDAE Pocock 1898.
- 65. PRODIDOMIDAE Simon 1894.
- *66. HOMALONYCHIDAE Petrunkevitch 1923.
- 67. CITHAERONIDAE Caporiacco 1937.

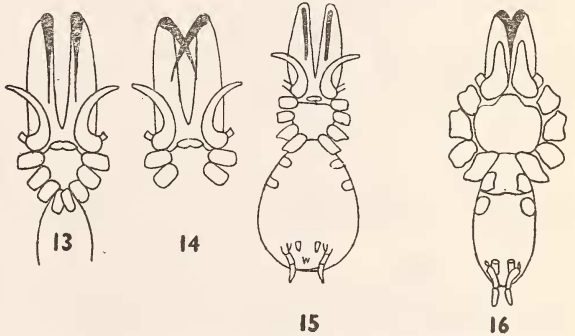
- *68. CLUBIONIDAE Wagner 1888.
- 69. ANYPHAENIDAE Bertkau 1878.
- 70. AMAUROBIOIDIDAE Hickman 1949.
- 71. ZORIDAE Dahl 1912.
- *72. CTENIDAE Keyserling 1876.
- *73. SPARASSIDAE Bertkau 1872.
- *74. HETEROPODIDAE Pocock 1896.
- *75. SELENOPIDAE Cambridge 1900.
- *76. PLATORIDAE Simon 1890.
- *77. THOMISIDAE Sundevall 1833.
- 78. APHANTOCHILIDAE Thorell 1873.
- *79. SALTICIDAE Blackwall 1841.
- *80. LYSSOMANIDAE Banks 1892.

ILLUSTRATED KEY FOR IDENTIFYING THE FAMILIES OF COMMON INDIAN SPIDERS

1a. Chelicerae paraxial, i.e. projecting forward and fang articulated with chelicerae in a vertical plane and movable in a plane more or less parallel to the median plane of the body, fang closing backward (Figs. 11-14). With two pairs of book lungs (Figs. 15, 16) Suborder ORTHOGNATHA-2



Figs. 11-12. Fang action in the Orthognatha, lateral view. (11) Fang closed. (12) Fang opened.



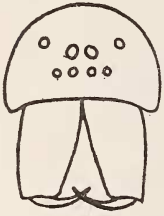
Figs. 13-14. Fang action in the Orthognatha, front view. (13) Fang closed. (14) Fang opened.

Figs. 15-16. Ventral view of Labidognatha. (15) *Calommata fulvipes* (16) *Atypus niger*.

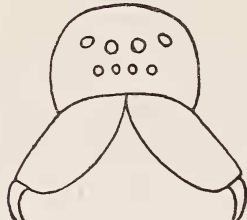
1b. Chelicerae diaxial, i.e. projecting downward and fang articulated with chelicerae in a horizontal plane and movable in a more or less transverse plane (Figs. 17-20). Commonly with one pair of

book lungs (Fig. 46) .. Suborder LABIDOGNATHA-7

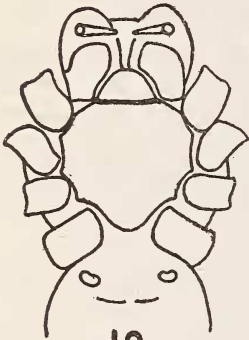
2a. Abdomen with one to nine sclerotized tergites (Fig. 21). Furrow of cheliceral fang indistinct.



17



18



19



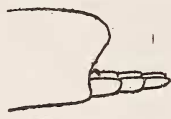
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Figs. 17-20. Fang action in the Labidognatha. (17) Closed. (18) Opened. (19) *Ctenium banksi*. (20) *Dysdera crocata*.

Anal tubercle not immediately behind spinnerets, but separated from the spinnerets by considerable distance (Fig. 21) The atypical tarantulas-3



21



22

Figs. 21-22. (21) Lateral view of *Calommata fulvipes* female. (22) Spinnerets and tubercle.

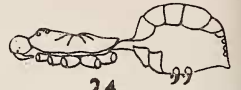
2b. Abdomen without sclerotized tergites. Anal tubercle immediately behind the four spinnerets (Fig. 22). Furrow of cheliceral fang distinct. Typical tarantula-4.

3a. Abdomen furnished with nine distinct tergites. Maxillae normal. Eight spinnerets situated in the lower middle of abdomen. (Fig. 24). Family LIPHISTIDAE

3b. Abdomen not furnished with distinct tergites. Maxillae strongly developed and labium fused with sternum (Fig. 16). Six spinnerets, situated in the



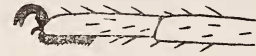
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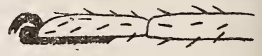
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Figs. 23-24. (23) Cephalothorax and abdomen of the Mygalomorphae. (24) Cephalothorax and abdomen of the *Liphistius*.

lower end of abdomen. (Fig. 23) Family ATYPIDAE



25



26

Figs. 25-26. Showing scopulae and claw tufts of Theraphosidae.

4a. Tarsi with a small median (a) as well as two large lateral claws, and without claw tufts (Fig. 25) 5

4b. Tarsi with only two claws and with claw tufts (Fig. 26) Family THERAPHOSIDAE

5a. Chelicerae with a rastellum (Figs. 27, 29). Posterior spinnerets short or moderately long, anterior spinnerets close together at base 6

5b. Chelicerae without rastellum. Posterior spinnerets very long, anterior spinnerets separated by at least their length (Fig. 28). Family DIPLURIDAE



27



28



29

Figs. 27-29. (27 & 29) Showing rastellum of chelicera. (28) Ventral view of abdomen of Dipluridae.

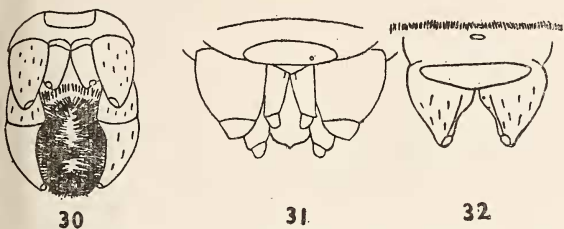
6a. Head region much higher than the thoracic region. Tarsi without unguinal tufts. Family CTENIZIDAE

6b. Head region not much higher than the tho-

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racic region. Tarsi with distinct ungual tufts.....
 Family BARYCHELIDAE

7a. With a cribellum in front of spinnerets (Figs. 30-32) and a calamistrum on metatarsus IV, varying from just a few bristles to a row the entire length of the metatarsus (Fig. 33)
 Section CRIBELLATAE-8



Figs. 30-32. (30) Showing spinnerets and cribellum of *Oecobius*. (31) Showing spinnerets and cribellum of *Hyptiotes*. (32) Showing spinnerets and cribellum of *Amaurobius*.

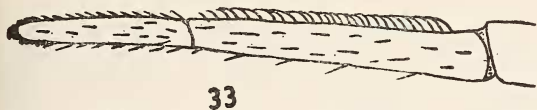


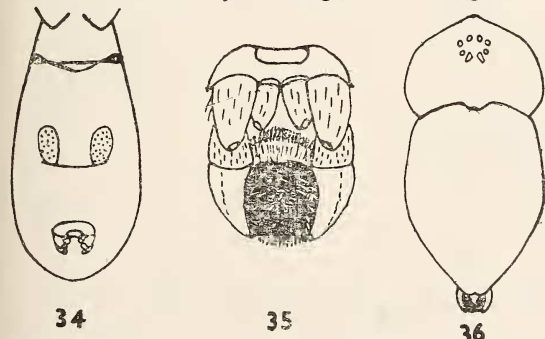
Fig. 33. *Dictyna* calamistrum.

7b. Without a cribellum and calamistrum.
 Section ECRIBELLATAE-15

8a. With two pairs of lungs (Fig. 34)
 Family HYPOCHILIDAE

8b. With only one pair of lungs. 9

9a. Anal tubercle large and prominent, two segmented with a fringe of long hairs (a) (Fig. 35). Posterior median eyes triangular or irregular in



Figs. 34-36. (34) Ventral view of *Hypochilus*. (35) Ventral view of *Oecobius*. (36) Dorsal view of *Oecobius*.

shape. Small spiders 2 to 2.50 mm long with carapace sub-circular (Fig. 36).
 Family OECOBIDAE

9b. Anal tubercle of the usual type, without a conspicuous fringe of hairs. Posterior median eyes circular. 10

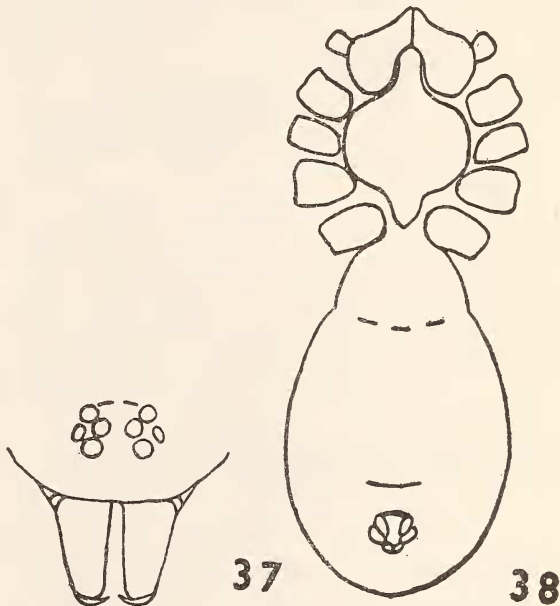
10a. Head region large, rounded, high, posterior lateral eyes remote from the rest. Family ERESIDAE

10b. Head low, narrowed, posterior lateral eyes very rarely remote from the others. 11

11a. Tarsi furnished with ungual tufts and an inferior claw Family PSECHRIDAE

11b. Tarsi without ungual tufts and inferior claw 12

12a. Chelicerae fused together at the base. (Fig. 37). Labium fused to the sternum (Fig. 38). Tracheal spiracle considerably in advance of the spinnerets. Calamistrum short (Fig. 39)
 Family FILISTATIDAE

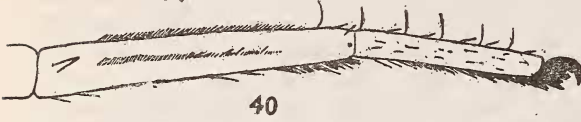


Figs. 37-38. (37) Front view of *Filistata*. (38) Ventral view of *Filistata*.

12b. Chelicerae not fused at base. Labium free. Tracheal spiracle in the usual position close to the spinnerets. Calamistrum much longer (Fig. 40) 13

13a. Tarsi with a dorsal row of trichobothria. Eight eyes all light in colour, homogeneous.

..... Family AMAUROBIDAE
 13b. Tarsi either without trichobothria, Eight eyes, either all dark or eyes heterogeneous. 14



Figs. 39-40. (39) *Amaurobius*, IV leg showing calamistrum and trichobothria. (40) *Filistata*, IV leg showing calamistrum.

14a. Eyes eight, homogeneous, dark, both rows recurved. Metatarsus IV compressed and concave above (Fig. 41). Family ULOBORIDAE

14b. Eyes eight heterogeneous, the anterior medians alone dark, Metatarsus IV of the usual shape. Family DICTYNIDAE

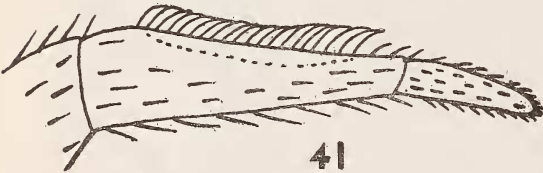


Fig. 41. *Hyptiotes*, IV leg showing calamistrum.

15a. Tibia and metatarsus I and II with a pro-lateral row of long spines, in the intervals between which is a row of much shorter spines, curved near their ends and increasing in length distally (Fig. 42) Family MIMETIDAE

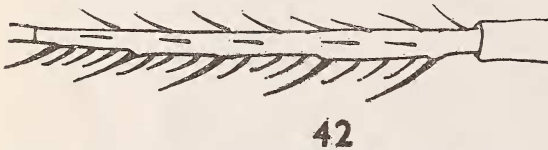


Fig. 42. *Mimetus*, metatarsus I showing spination.

15b. Tibia and metatarsus I and II without spines or spine arrangement not as illustrated in (Fig. 42). 16

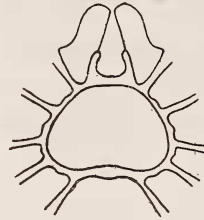
16a. Sternum much wider than long, the posterior coxae widely separated. (Fig. 43). Family PLATORIDAE

16b. Sternum not wider than long, posterior coxae not widely separated. 17

17a. Posterior spinnerets absent or much shorter than the anterior. Family ZODARIIDAE

17b. Posterior spinnerets present, not shorter than anterior 18

18a. Posterior spinnerets enormously long, usually longer than the abdomen (Fig. 44). Family HERSILIIDAE



43



44

Fig. 43. *Plator*, showing sternum.

Fig. 44. Abdomen with spinnerets of Hersiliidae.

18b. Posterior spinnerets shorter and thick .. 19

19a. Anal tubercle very large, fringed with long hairs, ocular group compact. .. Family UROCTEIDAE

19b. Anal tubercle small, not fringed, ocular group not compact 20

20a. Tarsi long and flexible. Labium broader than long, legs very long and slender. Family PHOLCIDAE

20b. Tarsi of the usual type. Labium longer than wide. 21

21a. With less than eight eyes. 22

21b. With eight eyes. 25

22a. Eyes six in three groups. 23

22b. Eyes six in one group. 24



45

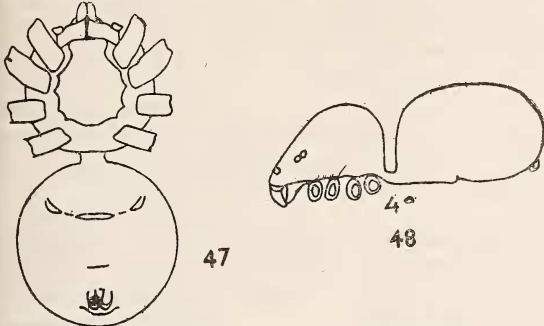


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Figs. 45-46. Dorsal view of *Loxosceles*. (46) Ventral view of *Loxosceles*.

KEY TO INDIAN SPIDERS

- 23a. Carapace round and high behind, sternum round behind. (Figs. 47-48). . . Family SCYTODIDAE
 23b. Carapace flat and depressed. Sternum pointed behind. (Figs. 45, 46). . . Family LOXOSCELIDAE
 24a. Very small spiders 1 to 3 mm long. Labium as wide as long. Median eyes larger than the laterals. (Fig. 49). Family OONOPIDAE



Figs. 47-48. (47) Ventral view of *Scytodes*. (48) Lateral view of *Scytodes*.

- 24b. Small but larger than Oonopidae, eyes two, or four or six in number (Figs. 50, 51). Epigastric furrow far behind the normal region. Family CAPONIIDAE

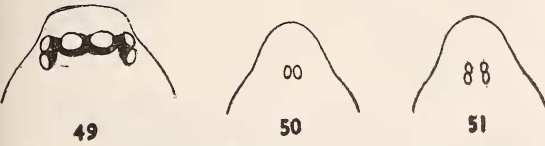
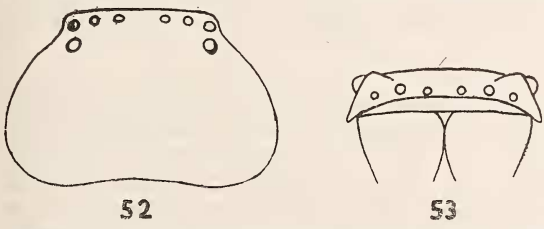


Fig. 49. Eyes of Oonopidae.
 Figs. 50-51. Eyes of Caponiidae.

- 25a. Anterior row with six eyes (Figs. 52, 53). Family SELENOPIIDAE



Figs. 52-53. Eyes of Selenopidae. (52) Dorsal view. (53) Front view.

- 25b. Anterior row with four or two eyes 26
 26a. Tarsi with two claws, with claw tufts. . . 27

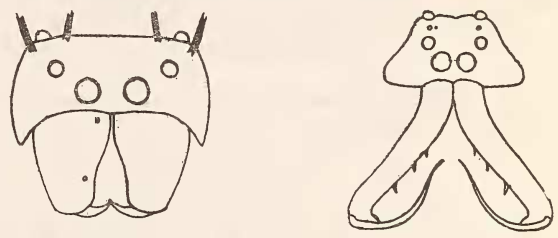
- 26b. Tarsi with three claws, without claw tufts. 37
 27a. Tarsal claws without teeth (Fig. 54). . . .



54

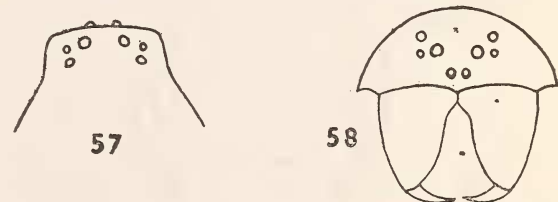
Fig. 54. *Homalonychus*, tarsus.

- Family HOMALONYCHIDAE
 27b. Tarsal claws with usual teeth 28
 28a. Eyes in three or four rows. 29
 28b. Eyes in the more common arrangement of two rows. 32
 29a. Eyes in four rows, the front very large (Fig. 56). Family LYSSOMANIDAE
 29b. Eyes in three rows 30
 30a. Front row of eyes more or less vertical face; median eyes enormously large, (Fig. 55), second row of two very small, often minute, third row of two eyes of medium size. Family SALTICIDAE



Figs. 55-56. (55) *Phidippus*, carapace from the front. (56) *Lyssomanes*, carapace front view.

- 30b. Front row of eyes not vertical, and eyes of this row smaller than those of the second. 31
 31a. First row of two eyes, second row with four and third row with two. (Figs. 57, 58). Anterior



Figs. 57-58. (57) *Ctenus*, showing eyes from above. (58) *Ctenus*, showing eyes from front.

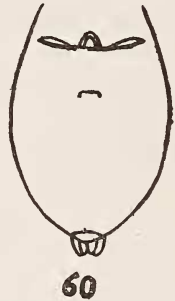
lateral much closer to the posterior laterals than to the anterior medians. Retromargin of cheliceral fang furrow with at least three teeth. Family CTENIDAE

31b. First row with four eyes, second and third row each with two (Fig. 59). Anterior laterals much closer to anterior medians than to the posterior laterals. Retromargin of cheliceral fang furrow with two teeth. Family ZORIDAE

32a. Tracheal spiracle in advance of the spinnerets at least one-third of the distance between the latter and epigastric furrow (Fig. 60). Family ANYPHAENIDAE



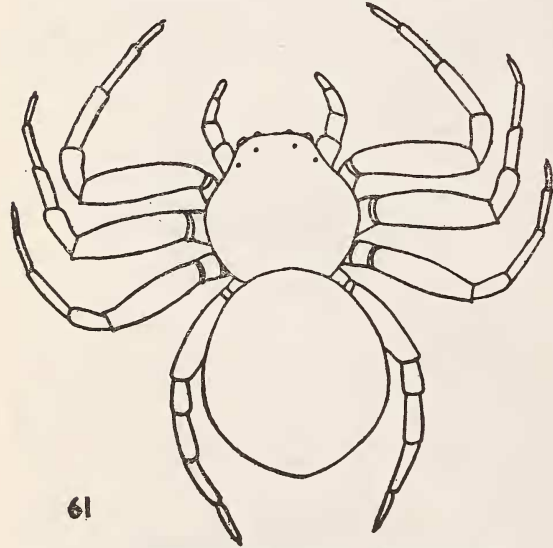
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60

Figs. 59-60. (59) Showing the eyes of Zoridae. (60) Showing the ventral view of abdomen of Anyphaenidae.

32b. Tracheal spiracle in the usual place just in front of spinnerets. 33



61

Fig. 61. Crab-spider showing laterigrade legs.

33a. Legs at least I and II laterigrade, crab-like (Fig. 61). 34

33b. Legs all usual prograde type 36

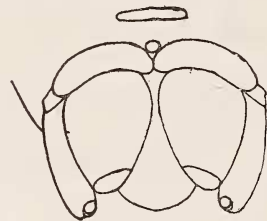
34a. Colulus absent. Retromargin of cheliceral fang furrow armed with teeth. 35

34b. Colulus present (Fig. 62). Retromargin of cheliceral fang furrow smooth. Family THOMISIDAE

35a. Cephalothorax as long as wide. Posterior row of eyes recurved, anterior row straight or procurved, lateral eyes larger. Apex of metatarsus with a soft trilobate (Fig. 64). .. Family HETEROPODIDAE

35b. Cephalothorax as long as wide or slightly longer than wide. Posterior row of eyes straight or slightly procurved, anterior row usually straight and subequal, lateral not larger than medians. Family SPARASSIDAE

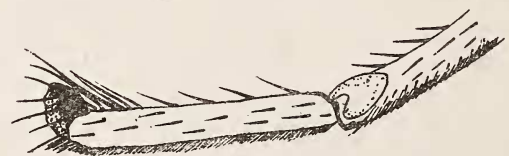
36a. Anterior spinnerets conical, contiguous. Maxillae without a transverse or oblique depression. Eyes homogeneous or almost so (with few exceptions). (Fig. 63). Family CLUBIONIDAE



62



63



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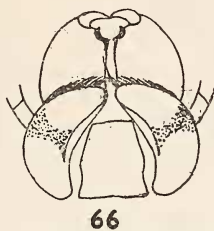
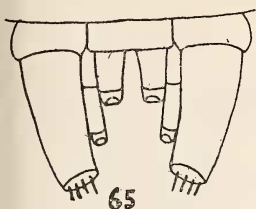
Figs. 62-64. (62) *Xysticus*, spinnerets and colulus. (63) *Clubiona* spinnerets. (64) *Heteropoda* leg, metatarsus and tarsus.

36b. Anterior spinnerets cylindrical, and separated by a distance about equal to the diameter of one (Fig. 65). Maxillae with an oblique depression. (Fig. 66). Eyes distinctly heterogeneous, the anterior medians dark; the posterior medians often oblique, oval, or triangular. .. Family GNAPHOSIDAE

37a. The six spinnerets in a more or less transverse row (Fig. 67). Tracheal spiracle removed from the spinnerets at least one third of the distance to epigastric furrow. Family HAHNIIDAE

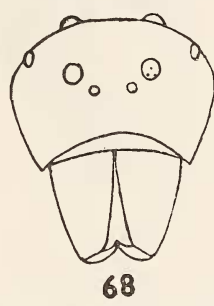
KEY TO INDIAN SPIDERS

37b. Spinnerets not so placed, but of the usual arrangement. Tracheal spiracle in the usual place in front of the spinnerets. 38



Figs. 65-66. (65) *Gnaphosa*, spinnerets. (66) *Gnaphosa* showing maxillae and labium.

38a. Eye groups hexagonal, the posterior row procurved, and anterior row recurved, with the clypeus high (Fig. 68). Abdomen pointed behind and legs with very conspicuous spines.
 Family OXYOPIIDAE



Figs. 67-68. (67) Showing spinnerets of Hahniidae. (68) Showing eyes of *Oxyopes*.

38b. Eye groups not forming a hexagon, and clypeus much lower. 39

39a. Tarsus IV with, in most specimens provided for at least one sixth its length from the distal end with a ventral row of 6 to 10 serrated bristles, forming a comb (Fig. 69) which may be poorly developed in males. Spiders hanging in an inverted position in irregular mesh webs. .. Family THERIDIIDAE

39b. Tarsus IV without such combs. 40

40a. Tarsi with trichobothria (Fig. 70) 41

40b. Tarsi without trichobothria. 45

41a. Tarsi with single row of trichobothria (Fig. 71). Trochanters not notched, most species living in sheet webs with a funnel, over which they run rapidly in an upright position. .. Family AGELENIDAE

41b. Tarsi with numerous trichobothria, but irregularly distributed (Fig. 69). All trochanters

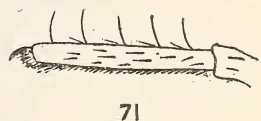
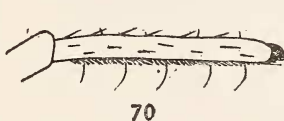
with a curved notch. 42

42a. Posterior row of eyes so strongly recurved that it may be considered to form two rows (Fig.



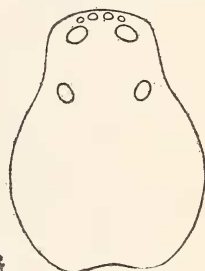
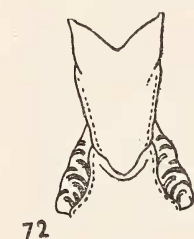
Fig. 69. *Theridion*, tarsus IV showing comb of serrated bristles.

73). Median claw smooth or with a single tooth. Anterior piece of lorum (a) rounded behind and fitting into a notch of the posterior piece (Fig. 72).



Figs. 70-71. *Lycosa*, tarsus showing trichobothria.

Egg sac carried attached to spinnerets and young carried on mother's back. Family LYCOSIDAE



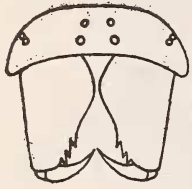
Figs. 72-73. (72) *Lycosa* lorum of pedicel. (73) Showing eyes of *Lycosa*.

42b. Posterior row of eyes not forming two distinct rows, but only slightly recurved. Median claw with two or three teeth. Anterior pieces of lorum with a notch into which the posterior piece fits. Egg sac held under cephalothorax. Young not carried by mother. Family PISAURIDAE

43a. Clypeus in most lower than the height of the median ocular area (Fig. 74). Eyes homogeneous (Most are orb weavers). 44

43b. Clypeus usually as high as or more commonly higher than, height of the median ocular

area (Fig. 75). Eyes heterogeneous (The majority are not orb weavers). 45



74



75

Figs. 74-75. (74) *Araneus*, face and chelicerae. (75) *Pityohyphantes*, face and chelicerae.



76



77



78

Figs. 76-78. (76) *Tetragnatha* ventral view of abdomen and showing procurved epigastric furrow. (77) *Tetragnatha* showing body and chelicerae. (78) Lateral view of cephalothorax of *Araneus* showing boss.

44a. Epigastric furrow between lung slits procurved (Fig. 76). No boss on chelicerae. In most cases the chelicerae are large and powerful (Fig. 77). Family TETRAGNATHIDAE

44b. Epigastric furrow nearly straight. Boss present on chelicerae (Fig. 78) though rudimentary in some cases. (True orb weavers). Family ARGIOPIDAE or ARANEIDAE

45a. Tibia of male pedipalp without apophyses (though the tibia may be dilated distally). (Fig. 79). Palp of female in most species with a claw at the end of the tarsus. Tibia IV in most species with two dorsal spines, or if only one spine is present then there is one short spine on metatarsi I and II. Family LINYPHIDAE

45b. Tibia of male pedipalp in most species with at least one apophysis (Fig. 80). Palp of female without a claw at end of tarsus. Tibia IV with a single dorsal spine or bristles and with the metatarsi spineless. Family MICRYPHANTIDAE



79



80

Figs. 79-80. (79) Male palp of *Lepthyphantes*. (80) Male palp of *Ceraticelus* with tibial apophysis.

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